

(FILE 'HOME' ENTERED AT 16:51:35 ON 24 JUL 2002)

FILE 'USPATFULL' ENTERED AT 16:51:47 ON 24 JUL 2002

L1 1741 S NAS OR NETWORK ACCESS SERVER
L2 0 S SERVER STATE ATTRIBUTE
L3 1311 S SERVER STATE ATTRIBUTE OR SSA
L4 8446 S RECOVER? (P) FAILURE
L5 530 S (BACKUP OR BACK UP) (2A) SERVER?
L6 1881 S DATA COMMUNICATION NETWORK
L7 35778 S DETECT? (P) FAILURE
L8 1937 S CALLIN OR CALL-IN USER#
L9 7129 S (CALLIN OR CALL-IN) (2A) USER#
L10 1358 S ENCODER AND SENDER
L11 44428 S RECONSTRUCT?
L12 98 S MEMORY READER
L13 19 S L1 AND L3
L14 93 S L3 AND L4
L15 8 S L5 AND L6
L16 121 S L7 AND L8
L17 114 S L9 AND L10
L18 19 S L16 AND L17
L19 17 S L11 AND L18
L20 17 S L19 AND L7
L21 17 S L10 AND L20
L22 1 S L13 AND L21
L23 1 S L1 AND L21
L24 1 S L3 AND L21
L25 0 S L5 AND L21
L26 1 S BACKUP AND L21
L27 1 S L5 AND L17
L28 140 S L5 AND L7
L29 1 S L28 AND L10
L30 31 S L28 AND ENCOD?
L31 31 S L30 AND SERVER#
L32 31 S DETECT? AND L31
L33 8 S NETWORK ACCESS AND L32

33 ANSWER 1 OF 8 USPATFULL

TI Computer system with adaptive heartbeat

PI US 6370656 B1 20020409

AB A computer system comprises a variety of components transmitting variable-rate heartbeats to a heartbeat monitor, each heartbeat indicating that the component is functioning properly. In addition, selected components serve as proxies by transmitting heartbeats to indicate that another component is functioning properly. In the preferred embodiment, one or more central processing units (CPUs) transmit heartbeats to indicate proper CPU functioning, while a bridge logic device and a network interface card (NIC) transmit heartbeats as proxies for a memory device and an external computer system, respectively. The heartbeat monitor is capable of determining initial heart rates for each component and is further capable of adaptively varying the heart rates thereafter. If the age of the heartbeat sender is relatively young, then a relatively slow heart rate is specified. Faster heart rates are specified for older components. Thereafter, the heartbeat monitor continuously tracks the age of the component, raising the heart rate as the component ages. In response to signals from a temperature sensor as well as various warning and error signals, the heartbeat monitor dynamically adjusts each heart rate independently. The heartbeat monitor may be implemented in a variety of ways, including incorporation into a computer system, as a dedicated unit coupled to a computer network, or as a software program. Further, the heartbeat monitor can receive variable-rate heartbeats from any desired device, from individual computer components to entire networks of computer systems.

L33 ANSWER 2 OF 8 USPATFULL

TI Dynamic modeling for resource allocation in a file **server**

PI US 6230200 B1 20010508

AB Resources in a file **server** are allocated by dynamically modeling a configuration of data handling components in the file **server** and routings of data streams through the data handling components. The dynamic model is a computer model maintained in memory by a controller of the file **server**. For example, the dynamic model is a directed acyclic graph in which nodes represent the data handling components and edges represent data stream paths. Each node has a list of resources and current allocations of the resources. Associated with each active data stream is a list of pointers to the nodes and current allocations for the data stream. The controller of the file **server** has programs for automatically creating the dynamic model, modifying the dynamic model in response to component changes such as component failures, enforcing a scheduling and admissions policy by allocating resources for a path for a data stream during a search through the dynamic model in response to a client request for data access, de-allocating resources in response to an end-of-stream condition, and balancing allocations of resources to data streams in order to free resources to allocate a path for a requested data stream. The dynamic model is created automatically by collecting information about what components are installed in the file **server**, the resources of the installed components, and connections between the installed components.

L33 ANSWER 3 OF 8 USPATFULL

TI Universal access multimedia data network

PI US 6101182 20000808

AB A system and method for providing Internet access via a Public Switched Telecommunications Network (PSTN) using full time asymmetric digital subscriber line connections between subscriber premises processor terminals and a local area network (LAN) node and router gateway on Telco premises connected to a Telco digital packet network connected to Internet service providers and Internet information providers. A domain name **server** (DNS) and a dynamic host configuration protocol

(DHCP) **server** are connected to the router to provide domain name to IP address translations and temporary assignment of IP addresses to said customer premises processor terminal. The customer or subscriber going on-line communicates with the DHCP using encryption and preferably public/private key encryption to both authenticate the customer and the DHCP. The DHCP updates the database in the DNS to maintain freshness. The digital packets in the network use several protocols with a TCP/IP payload encapsulated therein without the need for translation or conversion.

L33 ANSWER 4 OF 8 USPATFULL

TI Hardware and software failover services for a file **server**

PI US 5987621 19991116

AB A file **server** includes stream **server** computers linking a cached disk array storage subsystem to a data network, and at least two controller **servers** for receiving requests for file access from network clients. At any given time one of the controller **servers** is active and another is inactive in servicing client requests. The active controller **server** selects one of the stream **servers** to service each request. A controller **server** failover mechanism is provided for recovering from a failure of the active controller **server**, and a stream **server** failover mechanism is provided for recovering from a failure of a stream **server**. The inactive controller **server** becomes active when it fails to receive a signal periodically transmitted by the active controller **server**. The active controller **server** begins stream **server** failover when it fails to receive a signal periodically transmitted by each stream **server**. To resume automatically an interrupted task, the tasks are organized as a series of transactions, and each transaction includes operations which can be duplicated without substantial disruption. The active controller **server** commits results of each transaction to memory of the cached disk array. Before becoming active, the inactive controller recovers the committed state of the interrupted tasks from the cached disk array.

L33 ANSWER 5 OF 8 USPATFULL

TI Storage and access of continuous media files indexed as lists of raid stripe sets associated with file names

PI US 5974503 19991026

AB A continuous media file is comprised of stripe sets over disk drives in one or more RAID sets. In a preferred embodiment, the RAID set includes n disk drives. The data storage of each disk drive in the RAID set is partitioned into an integer number m of hyper-volumes, and the parity is stored in one hyper-volume of each of m disk drives in the RAID set. The stripe set includes a series of transfer units of data in respective ones of the disk drives. Each transfer unit includes an integer number j of data blocks, and each hyper-volume includes an integer number k of transfer units. Each stripe set includes $(m)(n-1)$ transfer units of data. The transfer units of the RAID set are allocated for the storage of continuous media data in a right-to-left and then top-to-bottom order in which the transfer units appear in an m row by n column matrix in which the rows of the matrix represent parity groups of hyper-volumes in the disk drives and the columns of the matrix represent storage in the respective disk drives. At most one write access to each parity hyper-volume need be performed during write access to a stripe set. Parity changes for the data being written are accumulated in non-volatile memory, and written to the RAID set after completion of the writing of the data.

L33 ANSWER 6 OF 8 USPATFULL

TI System having client sending edit commands to **server** during transmission of continuous media from one clip in play list for editing the play list

PI US 5892915 19990406

AB A protocol and interface provides continuous play over multiple clips for extended periods of time, allows a play-list to be edited dynamically after being given to the video **server** and during playback of clips in the play-list, allows some notion of "current time" to be used during the streaming of continuous media data, and supports features of the "Louth Automation" video disk communications protocol. Preferably, the client application first creates a session with a play-list containing a fixed number of entries; the number should be as small as possible consistent with the client's requirements. The client edits this play-list by appending the first few clips and then starts the session playing. Each time transmission of video data of a clip is completed, the clip is removed from the head of the play-list, all other clips are moved down, and a callback is issued to the client with the current, updated, play-list. A callback is also issued with the updated play-list to acknowledge each edit command. Preferably, there is a limit as to how close to air-time a clip normally may be deleted or new material inserted, in order to ensure continuity of transmission of the video stream of each clip. To allow live break-ins or other "emergency" operations, however, the session may be paused and later resumed and subsequent clips may be "trimmed" to reduce their play times to recover the time lost to the break-in.

L33 ANSWER 7 OF 8 USPATFULL

TI Universal access multimedia data network

PI US 5790548 19980804

AB A system and method for providing Internet access via a Public Switched Telecommunications Network (PSTN) using full time asymmetric digital subscriber line connections between subscriber premises processor terminals and a local area network (LAN) node and router gateway on Telco premises connected to a Telco digital packet network connected to Internet service providers and Internet information providers. A domain name **server** (DNS) and a dynamic host configuration protocol (DHCP) **server** are connected to the router to provide domain name to IP address translations and temporary assignment of IP addresses to said customer premises processor terminal. The customer or subscriber going on-line communicates with the DHCP using encryption and preferably public/private key encryption to both authenticate the customer and the DHCP. The DHCP updates the database in the DNS to maintain freshness. The digital packets in the network use several protocols with a TCP/IP payload encapsulated therein without the need for translation or conversion.

L33 ANSWER 8 OF 8 USPATFULL

TI Fault tolerant NFS **server** system and mirroring protocol

PI US 5513314 19960430

AB A network computer system providing for the fault tolerant storage and retrieval of data files includes a client system connected to a data communication network that may source a first data transfer request to said data communication network for the transfer or retrieval of data. A first **server** system, including first medium for storing data files, is connected to the data communication network so as to be responsive to first data transfer requests. A second **server** system, including second medium for storing data files is also connected to said data communication network to also be responsive to first data transfer requests. A control protocol, established between the first and second **server** systems, coordinates an asymmetric response by the first and second **server** systems to a first data transfer request, such that file data transferred by the client with the first data transfer request is replicated to the first and second storing mediums and such that file data transferred to the client system in response to the first data transfer is non-replicatively provided to the client system by either the first or second **server** system.

L21 ANSWER 1 OF 17 USPATFULL

TI Method for selecting frame encoding parameters in a frame-based communications network

PI US 2002080886 A1 20020627

AB A method for selecting frame encoding parameters to improve transmission performance for a transmitting frame being transmitted from a transmitting station to a receiving station over a transmission medium of a frame-based communications network is provided, the transmitting frame having a header segment and a payload segment, the header segment being transmitted using a fixed set of encoding parameters such that the header segment can be received and decoded by all stations on the network, the payload segment being transmitted using a variable set of payload encoding parameters, the transmitting station sending the transmitting frame using one set of the variable set of payload encoding parameters at a time. The receiving station receives and decodes the header and payload segments of each transmitting frame. The decoding includes computing frame statistics. A plurality of sets from the variable set of payload encoding parameters are selected to form a possible set of payload encoding parameters. For each set of payload encoding parameters in the possible set of payload encoding parameters an estimate of network performance characteristics expected if the transmitting station were to transmit the transmitting frame using that set of payload encoding parameters is generated based upon the frame statistics. A set of payload encoding parameters having optimized network performance characteristics is selected based upon the estimates of expected network performance for each set of payload encoding parameters in the possible set of payload encoding parameters.

L21 ANSWER 2 OF 17 USPATFULL

TI Method of sharing information among a plurality of stations in a frame-based communications network

PI US 2002057717 A1 20020516

AB A method of sharing information among a plurality of stations on a communications network, each of the plurality of stations being capable of transmitting and receiving frames over the communications network between any one station and all other stations. A group of agreed-upon flags is established, each flag of which may be set or not set by a station of the communications network at any given time. Periodic timing is provided in each station that expires after an interval, the interval being common among all the stations and being at least long enough to allow every station on the communications network to transmit a plurality of frames. A common frame format is defined providing the capability of specifying a current transmit flag set, an old transmit flag set, and a current receive flag set. Each station maintains: (1) a current transmit state set indicating by the agreed-upon flags the current capabilities and status flags for that station, (2) a recent timer expiration set indicating by the agreed-upon flags the capabilities and announced status flags for that station as they were at a most recent expiration of the periodic timing, (3) a previous timer expiration set indicating by the agreed-upon flags the capabilities and status for that station as they were at a penultimate expiration of the periodic timing, (4) a current transmit received set indicating by the agreed-upon flags a logical union of all copies of the current transmit flag set received in frames from other stations, and (5) a previous received set indicating by the agreed-upon flags the current transmit received set at the most recent expiration of its timer. A control frame is generated by a transmitting station wherein: (1) the current transmit flag set is set to a logical union of the current transmit state set and the recent timer expiration set, (2) the current receive flag set is set to a logical union of the current transmit received set and the previous received set, and (3) the old transmit flag set is set to the value of the previous timer expiration set. The control frame is generated and transmitted by the transmitting station to all other stations on the

communications network each time a flag in any of the logical unions is set or cleared and upon the expiration of the timer in the transmitting station.

L21 ANSWER 3 OF 17 USPATFULL

TI Method for selecting frame encoding parameters to improve transmission performance in a frame-based communications network

PI US 2002057713 A1 20020516

AB A method for selecting frame encoding parameters to improve transmission performance for a transmitting frame being transmitted from a transmitting station to a receiving station over a transmission medium of a frame-based communications network, the transmitting frame having a header segment and a payload segment, the header segment being transmitted using a fixed set of encoding parameters such that the header segment can be received and decoded by all stations on the network, the payload segment being transmitted using a variable set of payload encoding parameters, the transmitting station sending the transmitting frame using one set of the variable set of payload encoding parameters at a time. The receiving station receives and decodes the header and payload segments of each transmitting frame. The decoding includes computing frame statistics. A plurality of sets are selected from the variable set of payload encoding parameters to form a possible set of payload encoding parameters. For each set of payload encoding parameters in the possible set of payload encoding parameters, an estimate of network performance characteristics expected if the transmitting station were to transmit the transmitting frame using that set of payload encoding parameters is generated based upon the frame statistics. A set of payload encoding parameters having optimized network performance characteristics is selected based upon estimates of expected network performance for each set of payload encoding parameters in the possible set of payload encoding parameters. The frame statistics include a slicer maximum squared error for the header segment and a slicer maximum squared error for the payload segment.

L21 ANSWER 4 OF 17 USPATFULL

TI Method of enhancing network transmission on a priority-enabled frame-based communications network

PI US 2002042836 A1 20020411

AB A method of enhancing network transmission between stations on a priority-enabled frame-based communications network, the communications network having multiple transmit priorities and transmitting frames such that a network access time to transmit a frame of a lower transmit priority is longer than a network access time to transmit a frame of a higher transmit priority, the number of transmit priorities being fixed and all stations being capable of transmitting frames at any transmit priority. The method applies to each station. An initial transmit priority is established for each frame to be transmitted. A set of initial transmit priorities assigned to frames transmitted on the communications network is maintained. A set of final transmit priorities is established containing highest possible priorities, one final transmit priority being associated with each member of the set of initial transmit priorities, such that a highest initial transmit priority is assigned to a highest possible priority, a next highest initial transmit priority is assigned to a next highest possible priority, and so forth. Ordered frames are transmitted onto the communications network, each frame using a final transmit priority associated with the initial transmit priority established for the each frame.

L21 ANSWER 5 OF 17 USPATFULL

TI Method for providing dynamic adjustment of frame encoding parameters in a frame-based communications network

PI US 2002041570 A1 20020411

AB A method for providing dynamic adjustment of frame encoding parameters

to improve transmission performance for a transmitting frame being transmitted from a transmitting station to a receiving station over a transmission medium on a frame-based communications network, the transmitting frame having a header segment and a payload segment, the header segment being transmitted using a fixed set of encoding parameters, the payload segment being transmitted using a variable set of payload encoding parameters. The transmitting station sends the transmitting frame using one set of the variable set of payload encoding parameters at a time. The receiving station: (1) receives and decodes the header segment of each transmitting frame, (2) performs a decode process on the payload segment of each transmitting frame, and either decodes the payload segment without errors wherein the frame is considered successfully received, or detects an error occurrence in the decode process, (3) measures and tracks the performance of the frame decode process, (4) determines network performance characteristics for establishing desired performance based upon measuring and tracking the performance of the frame decode process, and (5) indicates to the transmitting station changes to the payload encoding parameters based upon determining network performance improvement characteristics. The transmitting station changes the one set of the variable set of payload encoding parameters corresponding to the changes to the payload encoding parameters indicated to the transmitting station for encoding next future transmitting frames.

L21 ANSWER 6 OF 17 USPATFULL

TI Method of controlling data sampling clocking of asynchronous network nodes in a frame-based communications network

PI US 2002027886 A1 20020307

AB A method of controlling data sampling clocking of asynchronous network nodes, each asynchronous network node having a local clock and transmitting and receiving packets to and from an asynchronous network according to an asynchronous network media access protocol. An asynchronous network node capable of transmitting and receiving packets on the asynchronous network is designated as a master node. Each non-master asynchronous network node which desires to synchronously transport packets across the asynchronous network is designated as a slave node. A master node clock of the master node is synchronized with a slave node clock of each slave node. Each slave node clock is continuously corrected compared with the master node clock to smooth slave clock error to an average of zero compared with the master clock as a reference using timestamp information from the master node. A derivative clock at the slave node is derived from the continuously correcting each slave node clock to control data sampling at the slave node.

L21 ANSWER 7 OF 17 USPATFULL

TI Method for distributing sets of collision resolution parameters in a frame-based communications network

PI US 2002026523 A1 20020228

AB A method for distributing sets of collision resolution parameters to be used for resolution of network access contention events among nodes of a non-centralized media access control shared medium network. A set of collision resolution parameters is provided which includes a sequence of fixed numbers for resolving a single network access contention event. A single collision signal slot master node is identified when one or more candidate collision signal slot master nodes exist. Collision signal slot request messages are sent from client nodes addressed to all network nodes. Collision signal slot assignment messages are sent from the master node to the client nodes. A collision resolution parameter set to be employed by that given client node is obtained at a given client node from within a received collision signal slot assignment message. Collision signal slot acknowledgment messages are sent from client nodes addressed to all network nodes. Collision signal slot drop messages are sent from client nodes addressed to all network nodes.

L21 ANSWER 8 OF 17 USPATFULL

TI Transceiver method and signal therefor embodied in a carrier wave for a frame-based communications network

PI US 2002012343 A1 20020131

AB A method and signal therefor embodied in a carrier wave for sending information from transmit stations to receive stations over a transmission medium of a frame-based communications network. The information is sent in transmit frames having a frame format comprising a fixed rate header, followed by a variable rate payload, followed by a fixed rate trailer. The fixed rate header includes a preamble. The preamble has a repetition of four symbol sequences for facilitating power estimation, gain control, baud frequency offset estimation, equalizer training, carrier sensing and collision detection. The preamble also includes a frame control field. The frame control field has scrambler control information for frame scrambling initialization, a priority field to determine the absolute priority a transmit frame will have when determining access to the transmission medium, a payload encoding field which determines constellation encoding of payload bits in the variable rate payload, and a header check sequence for providing a cyclic redundancy check. The variable rate payload is transmitted pursuant to dynamic adjustable frame encoding parameters for improving transmission performance for a transmit frame being transmitted from a transmitting station to a receiving station. The header also includes a destination address field, a source address field and an ethernet type field.

L21 ANSWER 9 OF 17 USPATFULL

TI Method for selecting an operating mode for a frame-based communications network

PI US 2002006136 A1 20020117

AB A method for selecting an operating mode for a frame-based communications network consisting of a plurality of stations attached to a transmission medium. The plurality of stations include both a first type station and a second type station. The first type station is capable of transmitting and receiving first protocol frames in accordance with a first protocol. The second type station is capable of transmitting and receiving both first protocol frames and second protocol frames in accordance with a second protocol. The first protocol and the second protocol each use different signals on the transmission medium. The first type station is not capable of reliably detecting second protocol frames. The first protocol has a first protocol frame format containing at least two reserved bits in a first protocol frame header which are ignored in received frames by first type stations and always sent with a same fixed value by first type stations. The first protocol frame format is redefined to provide an updated first protocol frame header wherein two reserved bits in the first protocol frame header are allocated as a mode selection indicator field in the updated first protocol frame header. The mode selection indicator field has meaning for second type stations.

L21 ANSWER 10 OF 17 USPATFULL

TI Method of determining a collision between a plurality of transmitting stations in a frame-based communications network

PI US 2001055311 A1 20011227

AB A method of determining a collision between two or more transmitting stations at one of the transmitting stations on a frame-based communications network. A transmitted frame header includes a cyclic preamble wherein identical copies of a preamble symbol sequence are transmitted sequentially. A collision is declared if an estimate of error power in second and third copies of the preamble minus an estimate of error power in third and fourth copies of the preamble exceeds a first threshold, or a maximum value of the norm of each term of a source field error vector minus a greater of the estimate of the error power in

the second and third copies of the cyclic preamble and the estimate of the error power in the third and fourth copies of the preamble exceeds a second threshold.

L21 ANSWER 11 OF 17 USPATFULL

TI Filtering audio signals from a combined microphone/speaker earpiece
PI US 5949891 19990907

AB An audio processing system applies a filter to convert the audio signals generated by the microphone of a combined microphone/speaker earpiece into filtered audio signals, where the filter is designed to correct for distortions in the audio signals that result from the microphone being part of the combined earpiece.

L21 ANSWER 12 OF 17 USPATFULL

TI Conversion system used in billing system for mobile satellite system
PI US 5913164 19990615

AB In a mobile satellite system, a mobile communication system includes a system for managing a mobile satellite system and a mobile communication system responsively connected thereto for registration. The system includes a management system (CMIS) requesting registration of the mobile communication system in the satellite communication system and creating a CMIS record responsive thereto, and a protocol conversion system (DM). The DM performs the functions of receiving and converting the CMIS record to a common record, and transmitting the registration request to the central controller of the CGS. The DM also receives a registration acknowledgement from the central controller indicating that the registration request was completed by the CGS, converts the registration acknowledgement into the common record, and transmits the registration acknowledgement to the CMIS. The DM also receives a ready indication for a commissioning status message from the central controller, transmits the status change response to the CMIS indicating a ready for commissioning status. The DM receives and transmits to the CMIS an operational/failed status message indicating whether the mobile communication system was successfully commissioned.

L21 ANSWER 13 OF 17 USPATFULL

TI Interrupt-time processing of received signals
PI US 5862388 19990119

AB A computer system with an operating system and a data-processing system running on a host processor, and a receiver. The receiver sends interrupt signals to the operating system after the receiver has received data signals. The operating system establishes interrupt times and passes the interrupt signals to the data-processing system. The data-processing system accesses the data signals from the receiver and only partially processes the data signals during the interrupt times. The operating system also receives clock interrupt signals, which it passes on to the data-processing system. The data-processing system completes the processing of the data signals during the clock interrupt times that the operating system establishes in response to the clock interrupt signals.

L21 ANSWER 14 OF 17 USPATFULL

TI Registration of computer-based conferencing system
PI US 5809237 19980915

AB A conferencing server accepts a conferencing session call from a conferencing node over a communications link. The conferencing server receives product registration information from the conferencing node over the communications link. The conferencing server transmits the product registration information to a registration database node, and the registration database node stores the product registration information in a registration database. The invention provides a mechanism for electronically registering video conferencing products.

L21 ANSWER 15 OF 17 USPATFULL

TI Dial lists for computer-based conferencing systems
PI US 5590128 19961231
AB The user of a local computer node (i.e., a caller) selects a remote computer node (i.e., a callee) for a computer conference call from a display containing a directory of possible callees. In one embodiment, the directory is an alphabetical combination of a network list maintained by a network administrator and a personal list for the caller. The user of the caller can access and edit the personal list, but only access the network list. When displayed to the user, the possible callees from the personal list are distinguishable from the possible callees from the network list.

L21 ANSWER 16 OF 17 USPATFULL

TI Media dependent module interface for computer-based conferencing system
PI US 5493568 19960220
AB The media dependent module provides an interface between an upper-level conferencing driver (e.g., a data-link manager) of the conferencing system and a lower-level communications driver of the conferencing system to isolate the conferencing driver from the communications driver, where the media dependent module is dependent upon hardware of the communications driver. The media dependent module is adapted to perform a plurality of functions called by the conferencing driver. The media dependent module has a connection state machine. In a preferred embodiment, the communications driver is a communications stack that conforms to one of the NetBIOS, IPX, POTS Modem, and TAPI transport standards. The conferencing system may have multiple media dependent modules, each of which provides an interface between the data-link manager and a communications stack that conforms to a different transport standard.

L21 ANSWER 17 OF 17 USPATFULL

TI Distributed processing system having plural computers each using identical retaining information to identify another computer for executing a received command
PI US 5287537 19940215
AB A distributed computer system having a plurality of digital computer systems interconnected by a bus. Each digital computer system runs one or more programs. When it receives a command directed to a system device or a program, it determines whether it can fulfill the command. If not, it determines which one of the other digital computer systems can fulfill the command based upon retaining information stored locally and forwards the command to the other digital computer system.